PATENT SPECIFICATION

DRAWINGS ATTACHED

870,414

Date of Application and filing Complete Specification May 21, 1959.

No. 17324/59.

Application made in Germany on May 21, 1958.

Complete Specification Published June 14, 1961.

Index at acceptance:—Class 108(2), D6A.

International Classification:—B62d.

COMPLETE SPECIFICATION

Improvements relating to Height Regulators for the Bodies of Motor Vehicles with Fluid Pressure Suspensions

We, DAIMLER-BENZ AKTIENGESELLSCHAFT, of Stuttgart-Untertürkheim, Germany, a Company organised under the laws of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to height regulators for the bodies of motor vehicles with fluid pressure suspensions. The invention is concerned with height regulators of the kind, hereinafter termed the kind specified, comprising a valve opening in one direction for the admission of pressure fluid from outside the regulator and a valve opening in the opposite direction for the outlet of pressure fluid from the regulator, the valves being operated by a stem or needle-like member in dependence on the position of the vehilce body relatively to the axles. The invention is applicable with advantage when the height regulator is installed in a hydro-pneumatic telescopic strut.

According to the invention, in a height regulator of the kind specified, the admission and outlet valves are disposed coaxially and the admission and outlet passages associated therewith are located one radially inwardly of the other. Advantageously, the two valves may be disposed with the openings which they control approximately in one plane. The outlet-valve opening may be located radially outwardly of the admission-valve opening.

The disposition of the valves coaxially and with the passages associated with them one radially inwardly of the other allows of an arrangement in which the valves are actuated conveniently by a single member and in which both valves are urged towards closed positions by the pressure fluid. In the case of a regulator incorporated in a telescopic strut, the admission and outlet of the pressure fluid can be effected from and towards the one direction. Moreover, both the admission valve and the outlet valve can be disposed in one part of the strut, namely in that part of the strut which is connected to the vehicle body. Thus, it is not necessary to dispose the outlet connection, for example, in the part of the strut which participates in the movements of a wheel axle.

The admission valve may be a ball valve and the outlet valve an annular plate valve. With this arrangement, the overall diameter of the valve unit can be kept small, particularly if the ball valve is displaced axially with respect to the other valve.

Two practical arrangements according to the invention are illustrated by way of example in the accomapnying drawing, wherein:—

Figure 1 is a central vertical section of a height regulator constituted as an independent structural part; and

Figure 2 is a central vertical section of a telescopic strut with a height regulator incorporated therein.

The height regulator in Figure 1, comprises a housing 1 with a through bore 2 in which is fixedly mounted a bush 3. An outward extension 4 of the bush 3 is externally screw threaded and surrounds an admission bore 5. Inside the bush 3 there is fitted a sleeve 8, the bore 6 of which at its inner end is reduced to form a valve seat 7. The passage-way through the bore 6 is normally closed by a valve 9 comprising a ball 10 which sits on the valve seat 7. The ball 10 is pressed on to its seat partly by a compression spring 11 disposed in the sleeve 8 and partly by the pressure of a medium passing through the admission bore 5. The sleeve 8 is stepped to a slightly reduced external diameter along a part of its length so that between the sleeve 8 and the bush 3 an annular gap 12 is formed. At

the upper end of the annular gap 12 a port 13 in the bush opens into an outlet bore 14 in the housing 1. The end faces of the bush 3 and of the sleeve 8 are situated in one plane and serve as seat surfaces for an annular outlet valve 15, which is disposed concentrically with and immediately beneath the admission valve 9. The valve opening, namely the mouth of the annular gap 12, is closed by the annular valve which comprises a rubber ring 16 supported on an annular flange 17. This annular valve is normally closed partly by the pressure of a spring 18 and partly by the pressure of fluid in the spring devices or struts which are in communication with regulator through connecting bores 19, 20 immediately beneath the annular valve. The connecting bore 19 leads for example to one strut on one side of the motor vehicle axis and the connecting bore 20 to another strut on the opposite side.

The flange 17 is formed on a cylindrical part 21 which is formed with ports 22. These ports 22 permit unobstructed flow of the pressure medium from the connecting bores 19, 20 and rapid discharge of the pressure medium through the valve 15.

A needle-like member or stem 23 is disposed in the bore 2 below the valve 15. This stem is guided on the one hand in a screw plug 24 in the lower end of the bore 2 and on the other hand by a piston part 25 fixedly mounted on such needle device and slidable in the bore 2. A reduced upper end portion of the stem projects through the cylindrical part 21 and the annular flange 17 to a point near to the ball 10 of the admission valve 9.

On inward deflection of the suspension, the vehicle axle moves towards the body and the stem 23 is moved towards the admission valve 9, advantageously after the axle has moved a predetermined distance and after suitable delay means have been overcome. The end of the stem 23 pushes the ball 10 away from its seat against the pressure of the spring 11 and the pressure medium is admitted at 5. The pressure medium entering the height regulator, in the direction of the arrow 26, can flow past the admission valve 9 and through the ports 19, 20 to the fluid pressure spring devices, in order to extend the latter and lift the vehicle body.

On outward deflection, the vehicle axle moves away from the body and the stem 23 is drawn away from the admission valve 9 and towards the outlet valve 15. An abutment disc 27 fastened on the stem comes against a bottom flange of the cylindrical part 21 and causes the latter to descend, thus opening the outlet valve 15 against the action of the spring 18. The pressure fluid present in the suspension spring devices can in this way pass through the passages 19, 20 and through the ports 22 past the outlet valve 15 and into the annular gap 12 from which it escapes through the port 13 into the outlet 14. Thus, the fluid pressure spring devices are relieved and the vehicle body moves towards the road wheel axles.

If the stem 23 is situated in a middle position, then both the admission valve 9 and the outlet valve 15 are tightly closed.

The hydro-pneumatic telescopic strut shown in Figure 2 is a spring device connectable at its bottom with an axle. It consists essentially of a cylinder 28, a strut piston 29 working therein, a housing 30 disposed concentrically thereto and a diaphragm 31 sealing the lower part of the housing. A regulating piston 32 contains in its rod part an admission valve 33 and immediately beneath its piston head an outlet valve 34 is disposed concentrically to the admission valve 33. The valves 33, 34 are of the same nature as the corresponding valves in the height regulator shown in Figure 1.

On inward deflection, the strut piston 29 moves inwardly of the working cylinder 28, and a stem 35, which is within the rod of the regulating piston 32 and is joined fast to the working cylinder 28 and to the housing 30, presses the admission valve 33 into the open position. On outward deflection, the strut piston 29 moves outwardly of the working cylinder 28, and the stem 35 by means of an abutment 36 draws the outlet valve 34 into the open position, so that oil can escape from the working cylinder 28 through the bore 37.

WHAT WE CLAIM IS:—

1. A height regulator of the kind specified for the body of a motor vehicle with fluid pressure suspension, wherein the admission and outlet valves are disposed coaxially and the admission and outlet passages associated therewith are located one radially inwardly of the other.

2. A height regulator as claimed in Claim 1, wherein the two valves are disposed with the openings which they control approximately in one plane.

3. A height regulator as claimed in Claim 1 or 2, wherein the outlet valve opening is located outwardly of the admission-valve opening.

4. A height regulator according to Claim 1, 2 or 3, wherein the admission valve is a ball valve and the outlet valve is an annular plate valve.

5. A height regulator according to Claim 1, the said regulator being incorporated within a hydro-pneumatic telescopic strut with the admission valve and outlet valve at different levels but with the admission and outlet connections in one part only of such strut.

6. A height regulator for the body of a motor vehicle with fluid pressure suspension, the said regulator being constructed and adapted for operation substantially as hereinbefore described with reference to Figure 1 of the accompanying drawing.

7. A height regulator for the body of a motor vehicle with fluid pressure suspension,

the said regulator being incorporated in a telescopic strut and comprising the parts constructed, arranged and adapted for operation substantially as hereinbefore described with reference to Figure 2 of the accompanying drawing.

JENSEN & SON,
Agents for the Applicants,
77, Chancery Lane, London, W.C.2,
Chartered Patent Agents.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.—1961.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

870,414 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

Fig.1

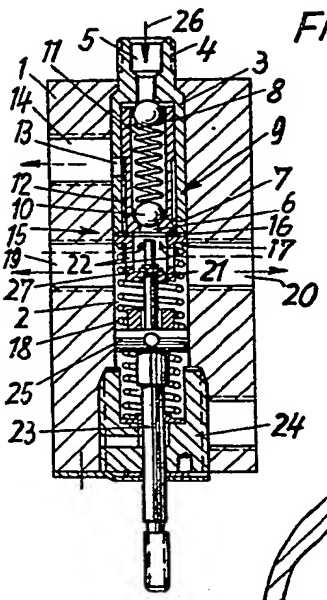

Fig.2